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ABSTRACT

The story recall abilities of 26 dyslexic children were tested, using a story schema representation previously used in research with normal children. Comparisons within the disabled reader group found significant differences in story schema knowledge, but comparisons between normal and disabled readers revealed no significant differences. However, reanalysis using a qualitative system revealed differences between normal and disabled readers in the coherence and completeness of their recall. The results indicated that disabled readers with lower verbal abilities are relatively poor at making inferences that link separate units of information, such as causal and temporal markers that help make texts more coherent. In addition, unlike more skilled readers, these reading disabled students are much less able to remember stories in verbatim form. (Author/RL)

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Remembering and Forgetting:

Story Recall Abilities of Dyslexic Children

David K. Dickinson and Phyllis A. Weaver

Harvard University

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CS 004 950

Abstract

Recently several cognitive psychologists have proposed that people use story schemata to guide comprehension and recall. Using Stein and Glenn's (1979) story schema representation, the story recall abilities of "dyslexic" children were tested. Comparisons within the disabled reader group found significant differences in story schema knowledge, but comparisons between normal and disabled readers revealed no significant differences. However, reanalysis using a qualitative system revealed differences between normal and disabled readers in the coherence and completeness of their recall. The results are interpreted as indicating that some disabled readers are relatively poor at making inferences which link separate units of information. This difficulty is related to general trends found in developmental psychology.

Attempts to understand and remedy reading disabilities have focused primarily on the lower level processes involved in word perception and decoding. Recently, however, there have been attempts to study the interaction among components at different processing levels (Adams & Collins, 1979; Frederiksen & Weaver, 1979; Lesgold & Perfetti, 1978; Rumelhart, 1977)--examining lower level processes in relation to those higher level processes involved in discourse comprehension and recall. The possibility that an interactive approach to reading problems might prove fruitful is suggested by the fact that, in addition to their well known problems with decoding, some disabled readers have been shown to have language comprehension deficits (reviewed in Weaver, 1978).

Our interest in story recall ability grew out of some recent work in cognitive psychology, where several attempts have been made to demonstrate the existence and importance of high level schemata in organizing and directing the comprehension and recall of stories. These schemata have been described formally in three different story grammars (Mandler & Johnson, 1977; Stein & Glenn, 1979; Thorndyke, 1977). And all three grammars are based on the assumption that stories are organized in terms of the plans and goals of the characters, and they include action sequences which begin with some initiating event and continue until the plan has been carried out and the goal state achieved.

Story grammars have been tested with adults (Mandler & Johnson, 1977; Mandler, 1978; Thorndyke, 1977) and children as young as six years old (Mandler, 1978; Stein & Glenn, 1977; 1979). These studies demonstrated

that both adults and children are better at recalling those parts of a story which the story grammars predict will be well remembered. The general conclusion drawn from this work is that people have expectations about story structure that enable them to construct organized representations and interpretations of specific stories.

The general aim of our study was to examine the nature of story recall in one group of severely disabled readers, a group labeled "dyslexic" by the directors of the school they attend. Our specific intention was to explore the extent to which deficiencies at the story schema level might be contributing to or co-occurring with other problems. In other words, along with their well documented problems of word recognition and memory, we speculated that they also might have inadequate schemata for stories.

Method

Subject Selection

The subjects were 26 boys attending a school for students with severe reading or learning disabilities. From the total student population of approximately 160, the parents of 70 consented to their children's participation. From this group we selected the 35 students who met our age and IQ score criteria. The two age groups of interest to us were 9.0 to 11.11 years old and 13.0 to 15.11 years old. Although there was no ceiling set for IQ, a WISC-R full scale IQ score of 95 was the lower limit. Of these 35 students, three were eliminated due to peculiarities noted in their records: either for extreme distractibility

or serious secondary emotional problems. Unfortunately, due to difficulties with our audio-recorder, we lost data from six students, thus our final sample size was 26. The mean age of the younger group was 10.3; it was 13.9 for the older group. The mean full scale WISC-R scores were 109 for the younger group (SD = 11.8) and 108 for the older group (SD = 9.4).

There is growing evidence in the literature on dyslexia that different IQ subscale patterns reflect different types of reading and language difficulties (Mattis, French, & Rapin, 1975; Roit, 1977); therefore, verbal and performance IQ score discrepancy was another variable of interest. One group had verbal scores nine points or more higher than their performance scores (V > P), one group had a less than nine point difference between verbal and performance scores (V = P), and the third group had verbal scores nine points or more lower than their performance scores (V < P). The mean full scale WISC-R's of these groups respectively were 111, 106, 110, and the differences between the mean verbal and mean performance scores were 23 points, .5 points, and 20 points. Our sample is considerably confounded in terms of age and IQ discrepancy. We only had one younger student in the V < P group, and we had no older students in the V > P group. This pattern reflects one cited in research literature suggesting that perceptual motor problems are more prevelent in younger reading disabled individuals, whereas language-related problems persist or become more apparent in older students (Roit, 1977; Vellutino, 1977).

Materials and Procedures

The four stories we used were taken from Stein and Glenn (1979). As calculated by the Spache Formula, readability levels ranged from 2.3 to 3.3, with an average of 2.75. The students were instructed to listen carefully in order to retell the stories later, and then they listened to the experimenter read two stories. After both stories, they were given a backwards counting task for about 45 seconds and then were asked to retell the stories just as they heard them. This procedure was repeated for the second pair of stories. The order of presentation of the stories was counterbalanced across the children. All protocols were transcribed and scored by people unaware of the students' ages and IQ profiles.

Results

Two different scoring systems were used: Stein and Glenn's system (1979) was applied to judge the presence or absence of story grammar categories, and subsequently we applied a system (developed by Dickinson) to explore finer-grained qualitative differences in recall. The results of our analyses using Stein and Glenn's scoring system are reported first. These speak to our original questions about the use of story schemata. We next report results using the qualitative coding system.

Story Schema Results

Using Stein and Glenn's system, the students' story protocols were scored for recall of semantic content of the units designated by the story grammar. Using these criteria, a response was scored correct whether

it preserved the semantic content in a verbatim form or in an altered syntactic form. To check our consistency in using Stein & Glenn's criteria, Stein scored 36 of our 104 recall protocols. The percentage of agreement between our scoring and hers was .97. The interrater reliability between our two scorers was .95.

The total number of correct category statements recalled was calculated and converted to a proportion which reflected the mean percentage of story grammar categories recalled by each child. These scores, reported in Table 1, are clustered by IQ discrepancy groups rather than by age because in preliminary analyses the IQ profile proved to be more powerful than age in determining recall differences.

Insert Table 1 about here

Stein and Glenn did not report variances, so tests of statistical significance could not be calculated, but it appears that there are no striking differences between Stein and Glenn's older children and two groups of reading disabled children. However, the low verbal group appears to be as much like the normal first graders as they are like the normal fifth graders. This is especially noteworthy because the mean age of this low verbal and high performance group was 13.5 years.

To determine the relative salience of the different categories, the mean proportion of categories recalled was calculated for each category in each story and the means were rank ordered. These rank orderings were compared with those given by Stein and Glenn and the Pearson rank

order correlation coefficients are .83 (Fox and Bear), .79 (Tiger's Whisker), .54 (Judy's Birthday), and .95 (Epaminondes). The one relatively low correlation coefficient was caused by a reversal in the ordering of three poorly recalled categories.

In our next analysis, we examined recall of story grammar categories by IQ group, and the results are presented in Table 2. In every category except one, children in the V > P group recalled more propositions than those in the V < P group. Using one-way analysis of variance, significant differences appeared for the direct consequence category, $F(2, 23) = 8.41$, $p < .002$. Total categories recalled approached significance, $F(2, 23) = 3.24$, $p < .058$.

Insert Table 2 about here

Using the blocking variable of IQ discrepancy, we computed planned comparisons, thereby testing for differences in a more sensitive manner. The first comparison was between the V > P group and the V < P group and the second comparison was between the V > P group and the other two groups. The first comparison was significant for minor setting, $t = 3.24$, $p < .01$, direct consequence, $t = 5.31$, $p < .001$, and total categories, $t = 2.47$, $p < .05$. For the second comparison, significant differences were found for major setting, $t = 2.33$, $p < .03$, minor setting, $t = 2.61$, $p < .03$, and direct consequence, $t = 4.65$, $p < .001$.

Within the disabled reader group there are differences among the IQ groups in the total amount of information recalled. However, if we

rank order the story grammar categories by total proportion of items recalled in each, the relative category salience is the same for all IQ groups except in one case. Minor setting information is recalled disproportionately less for the V < P group than for either of the other groups. When we compared relative category salience of the total reading disabled group with that of Stein and Glenn's normal readers, we found exact concordance: the two best recalled categories are major setting and direct consequence, the next two best are initiating event and attempt, and the three most poorly recalled are reaction, minor setting, and internal response.

Discussion of Results Using Stein and Glenn Scoring Scheme

Applying the scoring system and analytic techniques used by Stein and Glenn, we found two pieces of evidence suggesting that, taken as a group, reading disabled students have and use the same schemata for stories as do normal readers. First, in general, the overall rank ordering of categories recalled was the same for normal readers and disabled readers and among the three IQ subgroups within the disabled reader group. Second, the rank orderings of categories for each story were well correlated between normal and disabled readers.

We also found evidence suggesting that certain disabled readers, those in the V < P group, have less effective story schemata than the normal reader group. We base this conclusion on the finding that this group of disabled readers was significantly worse at recalling information from major setting and direct consequences, the two categories recalled

best at all ages (Mandler & Johnson, 1977; Stein & Glenn, 1979). Because schemata serve to guide attention and thus influence story comprehension and recall, relative decrements in the recall of salient categories indicates a relative insensitivity to those portions of a text which are essential to the overall story structure. In other words, what we find in the V < P group is a "flattening" of the differences between centrally important categories (major settings and direct consequences) and moderately important categories (initiating events and attempts). This finding bears a striking similarity to the results of Smiley, Oakley, Worthen, Campione, and Brown (1977), who found that seventh-grade poor readers did much worse than seventh-grade good readers at identifying and remembering those aspects of a story judged by skilled readers to be of central importance.

We speculate that the V < P disabled readers, like Smiley et al.'s poor readers, are relatively poor at recalling central information because they are less sensitive to the structure of stories, and that this insensitivity is related to inadequately developed schemata needed for efficient story comprehension and recall.

An Alternative Scoring System

Two considerations led us to develop an alternative to Stein and Glenn's scoring system. First, we could not assess possibly important qualitative differences between normal and disabled readers because the Stein and Glenn system was designed to test the validity of their grammar and thus scores in an all or none fashion; that is, it measures whether or not a grammar category is represented in recall, but it does not evaluate the nature of the information supplied. Second, we were concerned about

the large variations in absolute percentages of category information recalled across stories. For example, percentages of reactions recalled across stories varied from 19% to 52%, initiating events varied from 35% to 81%, and minor settings varied from 15% to 54%. Within stories we found similar variations in the recall of different propositions of the same story grammar category type.

The coding system we devised has nine categories: (1) verbatim recall (VB) which includes verbatim responses, pronoun substitutions, and limited synonym substitutions; (a) minor inferences (MNINF) which include slight paraphrases involving small word order changes and single word replacements; (3) major inferences (MAJINF) which include adding plausible information or replacing given information with a considerably changed version; (4) wrong recall (WRONG) which includes incorrect phrases or words that misconstrue action sequences; (5) less coherence (LESSCOH) which includes deletion of causal or temporal markers such as "because" or "before"; (6) added coherence (ADDCOH) which includes temporal or causal markers added in appropriate places; (7) less information (LESSINFO) which includes deletion of information not included in any other categories; (8) added information (ADDINFO) which includes addition of information not included in other categories; and (9) forgotten information (FORGOT) which includes omission of entire propositions or sentences.

Using this coding scheme, we rescored our students' protocols and twelve protocols from Stein and Glenn's fifth grade group. Their first

grade students' protocols could not be scored because they were not provided. In spite of the difficulties inherent in using a complex coding system, the percentage of agreement between our raters was 81%, and disagreements were easily settled by discussion.

Results of Qualitative Scoring

The total number of instances of each response type was converted to a proportion score that reflected the mean proportion of utterances by each child receiving that score. Using a student's "t" test, we compared normal and disabled readers' mean proportion scores on the nine categories (see Table 3). In every category except added information, differences were significant, and in every case the differences favored the normal readers. The three categories with the most striking differences were: minor inferences, $t = 6.28$, $p < .001$, with normal readers making more of these than disabled readers; less coherence, $t = 3.55$, $p < .001$, with disabled readers omitting temporal and causal markers more often; and verbatim recall, $t = 2.92$, $p < .01$, with normal readers reproducing more information in verbatim form than disabled readers.

Insert Table 3 about here

When we examined the response types for the three IQ discrepancy groups, we found significant differences only for the verbatim response category, $F(2, 23) = 4.86$, $p < .02$. Planned contrasts on verbatim recall revealed that the V >P group was significantly better than the V < P group and than the V = P and V < P groups taken together.

Using the qualitative scores as dependent variables and IQ scores as independent variables, we performed a set of regression analyses to determine which variables could best predict the amount of verbatim recall. We entered six independent variables (age, IQ discrepancy group, verbal IQ, performance IQ, total IQ, and the paragraph meaning subtest score from the Stanford Achievement Test) into a standard stepwise regression and had the computer program select the best predictor. The verbal IQ score was selected first and accounted for 38% of the variance ($p < .001$) in the verbatim recall scores ($R = .62$). Next we used forward stepwise regression to enter verbal IQ after controlling for total IQ and age and found that it accounted for an additional 42% of the total variance. These analyses offer strong support for a claim that verbal IQ is closely related to verbatim recall.

Discussion Based on Qualitative Scoring

Using a coding scheme designed to assess the quality of information supplied in story recall, we found several noteworthy differences between normal readers and disabled readers. The most striking differences were in the frequency of minor inferences, verbatim recall, less coherent recall, major inferences, and incorrect information. Therefore, we may say that the qualitative analysis reveals differences between normal and disabled readers to which a story grammar analysis is not sensitive.

Conclusions

We addressed two separate questions using two different scoring sytems: First, do disabled readers show evidence of using story schemata;

and second, what, if any, qualitative differences exist between the normal and disabled readers' story recall? In answer to the first question, disabled readers, like normal ones, do appear to have and use story schemata, although one group, the V < P group, seems to be deficient in this respect. And, regarding the second question, poor readers have a limited ability to recall details in verbatim form and they make few inferences that serve to increase the coherence of the story. These two findings strongly suggest that disabled readers have difficulty with efficient processing of verbal information. This is consistent with the position espoused by Vellutino (1977) that disabled readers have deficient verbal abilities which are far more important than any superficial perceptual problems they might also exhibit.

In general, the disabled readers seem to be constructing less informative representations of the stories than do the good readers. This finding echoes developmental findings which report (a) age-related increases in the use of temporal and causal markers in the stories children tell (Ingram, 1975); (b) improvements in the ability to tell logically related narratives (Applebee, 1978); (c) improvements in the ability to make inferences between propositions (Paris & Lindauer, 1976); and (d) the growing use of causal and temporal markers in response to questions about stories (Stein & Glenn, 1979). Research into children's use of syntactic and lexical markers of time in spontaneous speech also reveals that linguistic expression of time is mastered slowly, indicating the need for prior cognitive development (Cromer, 1968; 1971). Finally, it has been proposed

that the ability to bridge between separate incidents and coordinate them may be a general characterisitc of cognitive development (Siegel & White, 1975; White & Pillemer, 1979).

Developmental research thus suggests that poor readers' difficulty in recalling the coherence markers (temporal and causal) in stories may be like young normals, and can be interpreted as an indication of limited abilities to hold separate incidents in mind while interrelating them. Research with disabled readers corroborates this notion. For example, de Hirsch, Jansky, and Langford (1966) found that the ability to tell the story of The Three Bears in a detailed and organized manner was the best predictor of end-of-second-grade reading achievement, and poor readers were unable to produce well-formed renditions. Furthermore, disabled readers appear to have limited abilities when it comes to using context clues to correct reading errors (Weber, 1970) or to supply words in cloze tests (Neville & Pugh, 1976-1977). Failure to use context may reflect inadequate ability to construct meaningful representations of text, relate them to subsequent text, and then make the requisite inferences. Denner (1970) demonstrated that such a process of meaning construction and synthesis was related to the problems poor readers have. Children from first through fifth grades were taught separate logographic symbols and then were asked to synthesize them and carry out the correct actions implied by them. Poor readers performed significantly worse at synthesizing meanings than good readers even though they showed similar comprehension of the separate symbols.

Why do poor readers, like young normals, have difficulty constructing, manipulating, and interrelating meaningful representations of connected text? Pointing to developmental parallels only deepens the question because we have no generally accepted explanation for the course of cognitive development. But posing the problem in this form may be helpful because it suggests the importance of considering information processing speed. If a child is slow in recognizing words, or has trouble retrieving word meanings, then the process of relating concepts and constructing relationships between them will be impaired. There is certainly research evidence to suggest a highly significant relationship between word recognition speed and reading comprehension ability (e.g., Frederiksen, 1979; Perfetti & Hogaboam, 1975; Perfetti & Lesgold, 1979). Therefore, it is reasonable to hypothesize that poor readers who are slow to retrieve lexical items are likely to severely decrease the processing capacity available for constructing relationships among words or propositions.

The significant differences we found in verbatim recall between normal and disabled readers might be interpreted as reflecting a failure to use rehearsal strategies which could be attributed in part to slower information processing. Developmental research has demonstrated convincingly that the use of memory strategies is age-related and improves performance on memory tasks (Brown, 1975; Flavell, 1977) including text recall tasks (Wanner, 1969), and failure to use memory strategies has been indicated among disabled readers who do poorly on tasks where rehearsal would aid performance (see Farnham-Diggory, 1978, pp. 102-113 for review). Given these findings we believe that it is reasonable to hypothesize that our

poor readers' limited verbatim recall was caused at least in part by rehearsal failures.

In conclusions, it appears that certain disabled readers (the type with higher verbal ability) closely resemble normal age peers in the use of story schemata for story comprehension and recall. Whereas another type of poor reader (with lower verbal ability) seems to be less sensitive to certain aspects of story schematic structure. Furthermore, the reading disabled students we observed have deficits in their ability to reproduce or infer causal and temporal markers which serve to make texts more coherent. In addition, unlike more skilled readers, these reading disabled students are much less able to remember stories in verbatim form. And we suspect that these differences are closely related to deficiency or inefficiency in verbal information processing.

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Table 1

Mean Proportion of Total Story

Categories Recalled by Story and Reader Group

Group	STORY				
	Epamin-ondas	Tiger's Whisker	Fox and Bear	Judy's Birthday	Total
Normal					
First Grade	.47	.48	.42	.47	.46
Fifth Grade	.65	.58	.51	.54	.57
Disabled					
V < P[a]	.66	.48	.41	.51	.49
V = P[b]	.63	.57	.52	.49	.52
V > P[c]	.76	.67	.52	.52	.59
Mean Total[d]	.66	.56	.48	.50	.52

[a] $n = 9$

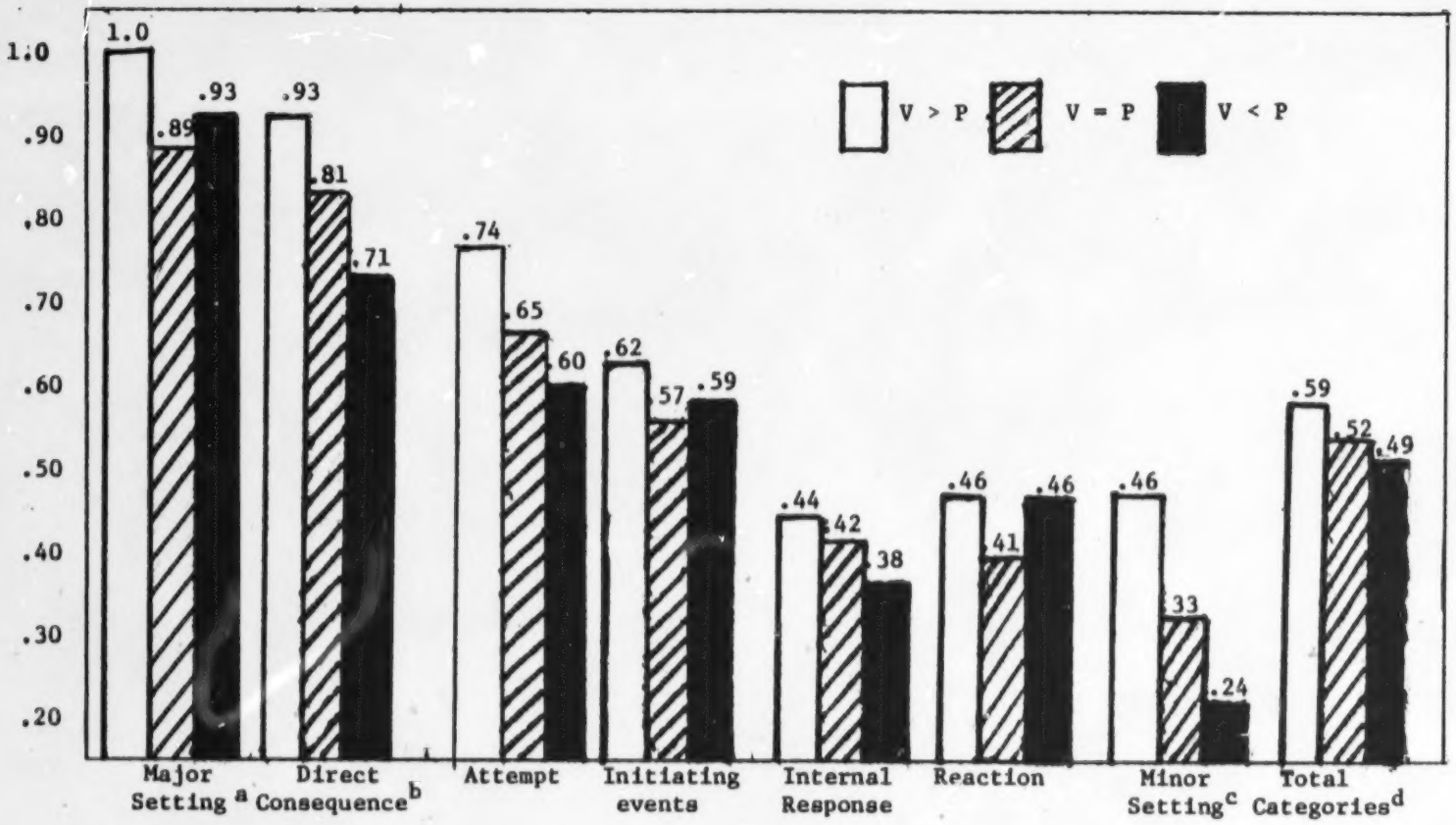
[b] $n = 12$

[c] $n = 5$

[d] $N = 26$

Table 2

Mean Proportion of Story Grammar Categories Recalled by IQ Discrepancy Group



Planned comparisons

a[1] t=2.33 p=.03
b[2] t=5.31 p<.001
c[1] t=3.24 p=.01
d[1] t=2.47 p=.05

1. V > P vs. V < P and V = P
2. V > P vs. V < P

Table 3

Comparison of Normal and Disabled Readers on

Total Proportion of Response Types for Four Stories

Response[a] Type	Disabled (N = 26)[b] M	SD	Normal (N = 12) M	SD	"t" (df=36)	
FORGOT[c]	36.71	8.8	29.03	9.6	2.27	.05
LESSINFO[d]	6.42	2.2	6.68	2.7	2.11	.05
MININF[e]	8.14	2.7	13.00	1.9	6.28	.001
VB[f]	7.19	3.18	13.32	6.6	2.92	.01
LESSCOH[g]	6.42	2.2	3.80	1.9	3.55	.01
MAJINF[h]	4.36	2.6	2.43	1.7	3.18	.01
ADDCOH[i]	3.64	1.2	5.33	2.4	2.18	.05
ADDINFO[j]	3.22	2.0	3.20	1.7	-	ns
WRONG[k]	1.80	2.0	.63	.62	2.69	.01

[a]The codes correspond to the response type listed in text.

[b]Mean age 12.1.

[c]Entire category of information omitted.

[d]Reduced information: deleted prepositional phrases, modifiers and clauses.

[e]Minor inferences: word order changes, single word replacements.

[f]Verbatim responses and pronoun substitutions.

[g]Reduced coherence: deletion of words marking temporal order or indicating causality.

[h]Major inferences: adding plausible information, replacing given information with considerably changed version.

[i]Added coherence: adding words which mark temporal order (i.e., then, before) or indicate causality (i.e., because, so).

[j]Added information: added prepositional phrases, modifiers and clauses.

[k]Incorrect recall: wrong characters identified and misconstruction of action sequences.